

SOME RECENT RECORDS OF THE FRESH-WATER JELLYFISH *CRASPEDACUSTA SOWERBII* FROM OHIO AND PENNSYLVANIA¹

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During the past two decades much interest has been shown in the freshwater jellyfish *Craspedacusta sowerbii* Lancaster. A monograph on the species by Dejdar (1934) tabulated all of the world-wide records of occurrence known up to the date of his study. Bennett (1932) had earlier summarized the published accounts from North America, and Schmitt (1939) and Zeliff (1940) have added to the compilation of North American records. Pennsylvania records begin with the discovery in 1885 of the hydroid stage of this hydrozoan coelenterate by Potts who described it as *Microhydra ryderi*. In 1897 he reported the discovery of the medusa stage. This was followed by a series of published observations and studies of which the publication of 1906 is the most important. Payne (1924) has shown the relation of the hydroid to the medusa stage and has shown that the generic name of *Craspedacusta* takes precedence over that of *Microhydra*. However, he retained the trivial name *ryderi* for the American specimens. Boulenger and Flower (1929) and Dejdar (1934) demonstrated that *C. ryderi* is identical with *C. sowerbii* as described originally by Lancaster from specimens first discovered in the lily tank of Regent's Park in 1880 and which reappeared in 1928. American writers of recent years have used both names, one about as often as the other. It seems to the writers, however, that *C. sowerbii* should be regarded as the valid name. Additional records from Pennsylvania have been published by Brooks (1932), Quick and Matthews (1937), and Kuster (1938). Collecting records from Ohio have been reported by Baird (1932), Kraatz (1933), Linscheid (1935), Kostir (1941), and Dunham (1941-42).

Many persons have kindly assisted the writers with their studies and with the compilation of other new discoveries of *C. sowerbii* in the Ohio-Pennsylvania region. These who have contributed collecting data are mentioned in connection with their records, and to them our sincere thanks are given. Others to whom we are indebted for assistance are as follows: Dr. Fernandus Payne, Dr. J. Paul Visscher, Mrs. Martha Linscheid, Mr. Paul Shively, Mr. Blake B. Hanan, Mr. H. K. Datson, and the General Biological Supply House. In making state-wide contacts regarding the occurrence of fresh-water jellyfish in Ohio, the senior writer learned of the work of Dr. Surrarrer and Mr. Davis on this species. They were invited to join him in the production of this combined report, and acknowledgment is hereby given to their splendid cooperation.

NEW RECORDS FROM OHIO

Alfred G. Linscheid of the Shaker Heights Schools found an abundance of fresh-water medusae in Green Lake at Shaker Heights in the fall of 1934. Specimens had first been brought to him by a student of his school, H. V. Caldwell, Jr., but

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none has been found there since that time. In October of that same year, abundant medusae were discovered in a goldfish pond at Nela Park in Cleveland Heights. These were studied by Mrs. Martha Linscheid who prepared a master's thesis on her studies for Western Reserve University (Linscheid, 1935) and presented a report of her work before the Ohio Academy of Science in the spring of 1935. Since that time Mr. Henry Donahower, who made the original discovery, has seen small numbers of medusae during various years but unfortunately written records were not made. In the last week of August, 1948, four specimens were collected. We were notified of this recent collection through the courtesy of Mrs. Harold R. Nissley. The pool, formerly a fire pool but now converted into an ornamental goldfish pond, is circular, has a diameter of 125 feet, a depth of 15 feet, and a capacity of 1.25 million gallons. It was constructed in about 1912. In spite of periodic cleaning of the pond every three to five years, the jellyfish have reappeared over a span of 14 years. Schmitt (1939) cited a number of similar cases where jellyfish have reappeared in the same artificial pool over a period of years.

Dr. William C. Stehr of Ohio University has collected medusae from a reservoir three miles north of Athens during late May and June every year since 1934. Only female specimens have so far been observed. Their abundance has fluctuated from year to year, but he found them particularly abundant in 1937 and 1942.

In September of 1936 and 1937, Prof. George R. Easterling of Kent State University collected medusae from a sand-pit quarry pond two miles northwest of Chillicothe. They were common in 1936, but much less numerous the second year. The pond was circular in outline with a diameter of about 200 feet and a maximum depth of 10-12 feet.

In August of 1940, fresh-water jellyfish were found in Round Lake, near Route 3 some 12 miles southwest of Wooster, in the corner junction of Holmes, Ashland, and Wayne Counties. Specimens were brought to the College of Wooster. Dr. Ralph V. Bingham of the college visited the lake within a short time after the discovery and collected a few specimens. Round Lake is a small, pot-hole type of lake with a maximum depth of about 45-50 feet and with margins of peat bog. It has a water surface of 35 acres. On August 13, 1949, Mr. Parke C. Wachtel of Mansfield discovered a number of fresh-water jellyfish on the west side of the lake in a section of less than an acre in area and with a depth ranging from 15 to 25 feet. He had fished this lake at least once each week and sometimes twice a week since April 1, but no jellyfish were observed until the 13th of August. Apparently they appeared sometimes between April 6 and 13. On August 20 the medusae were found in great abundance, but one week later they were much reduced in number. On August 30 he captured many specimens which were sent to Mr. E. L. Wickliff, Chief of the Fish Management Section of the Ohio Division of Wildlife, who placed them on exhibition at the Ohio State Fair. On September 3, Mr. Wachtel found only a few specimens still remaining in the lake, and by September 10 they had disappeared.

Blake B. Hanan collected specimens of *C. sowerbii* in the months of August, September, and October of 1941 from an old stone quarry lake (Smith quarry) near Berea (see figure 1) which had been abandoned for some 25 years. Some of the specimens were forwarded to Kent State University. He found the medusae in great numbers especially along the edges of the water where 2-3 specimens were found per square yard from the surface to a depth of about four feet. The body of water filling the quarry measured approximately 150 x 600 feet with an estimated depth of 60-70 feet. That same year Dr. Thomas C. Surrearrer collected specimens in October from the same quarry. The eight specimens which have been saved are all males. The gonads of 50 specimens, probably all of them males, placed in aquaria on October 21, ruptured on October 30. Other quarries in the vicinity which were examined did not yield any jellyfish that year. In September of 1942, *C. sowerbii* was again collected from Smith quarry but it was less abundant

than in the preceding year. In October of 1943, only a few specimens could be found there. This quarry was then drained and reworked, but soon abandoned once more. After its being refilled with water, medusae were not found again after a careful search in 1946, 1947, and 1948. In the fall of the years 1943-1947 inclusive, a number of jellyfish were found each year in a nearby quarry, West View quarry, but none was found there in 1948. In 1947, however, they were also present in a second quarry at West View. This one had been drained in 1944 and reworked for a time. Jellyfish were not found there in earlier years or in 1948. All three of these quarries at Berea were filled with deep-blue, clear water.

Mr. T. G. Gallagher, Chief of the Pollution Control Section of the Ohio Division of Conservation, discovered an abundant population of fresh-water medusae in Lake Alma in July of 1945. While fishing in the lake he observed a slowly moving stream of the jellyfish some 20 feet wide and about 200 yards long which moved in a counterclockwise direction around an island in the lake. One dip of a quart jar captured 17 individuals. They ranged in size from one-quarter of an inch to one inch in diameter, the average being about three-fourths of an inch. At the time

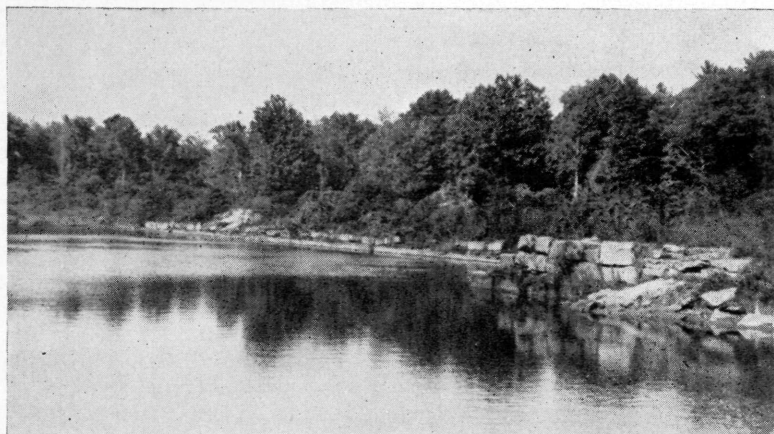


FIG. 1. Smith quarry near Berea. Typical quarry habitat of *Craspedacusta sowerbii*.
Photo by Blake B. Hanan.

of collecting, the surface water was 79°F. with a drop to 75°F. at a depth of 12 feet. The pH reading one foot below the surface was 6.4. The captured medusae were placed in an aquarium with two guppies, both of which were dead by the next morning. One of the fish had a large jellyfish clamped to it by its tentacles. Lake Alma is in Clinton Township of Vinton County, about two miles southeast of Hamden. It is an impounded lake built in 1900. An earthen dam has created a somewhat circular lake with an island near the center. There is a surface of 72.5 acres of water, an average depth of 9.7 feet, and maximum depth of a little over 16 feet. Roach and Pelton (1947) have published a limnological and fishery management survey report on this lake.

In September, 1947, a student of Kent State University brought to the biology laboratories a number of living medusae which he had collected from Stewart Lake, near Twin Lakes, in which they were very common. These were kept alive for several days as a demonstration in the laboratories. At the same time the senior writer heard of a report of jellyfish from Crystal Lake near Ravenna, only nine miles from Stewart Lake. Several specimens had been collected on August 31 by two students, Helen Stuart and George Price. On September 24, the lake was visited, at which time *C. sowerbii* was found to be still abundant. They were

widely distributed over the lake, but were particularly common on the leeward side. Three days later Walter Evans, a school boy living at the lake, collected a few specimens, but no more were seen after that date. All of the 42 specimens preserved from this lake were females. The size ranged from 6-12 mm. in diameter and the tentacles were arranged in six different size groups. Cladocerans and copepods were found entangled in the tentacles. Crystal Lake is a natural glacial lake of approximately 25 acres and with a greatest depth of about 30 feet. It is used as a water supply for the City of Ravenna and for sport fishing. Fishermen reported difficulty in getting fish to bite during the time when the jellyfish were at their peak of abundance. Possibly the fish were feeding on the medusae. Two fishermen, Howard Kastor and Gordon Klohn, claim to have seen a few jellyfish in this lake each year between 1937 and 1947, and a considerable number in about 1942. How dependable those observations were cannot be stated since specimens were not collected. In August, 1948, a total of four specimens was collected by Walter Evans which were the only ones found that year at Crystal Lake.

Also in the summer and fall of 1947, abundant specimens were collected from Lake Milton, 14 miles east of Crystal Lake. Charles W. Davis, assisted by Dr. Claire L. Worley of Youngstown College, collected medusae from a small bay of Lake Milton. In 17 years of living on the shore of this bay, the Davis family had never previously observed jellyfish in the lake. Many specimens were collected during the first two weeks of May. From the middle of June to the middle of July the jellyfish were most abundant. From the middle of July to August 10 only a few were seen, but after this date they became abundant again until the first week of September when they decreased in number. Few were obtained in September and none observed in October. All of the specimens observed that year were found restricted to the small bay directly in front of the Davis cottage, and for the most part centered around a snag of tree branches some 30 feet in diameter which had been submerged at the spot for attracting game fish. Jellyfish were observed floating up out of this snag. By striking the submerged branches with a boat oar, many individuals were liberated which came to the surface. Specimens which were preserved, about 25 in number, were all females (see figure 2). Lake Milton was impounded in 1916 in the Mahoning River Valley to supply water for the steel plants of Youngstown. It has an area at present of 1,700 acres, with a maximum depth of about 46 feet. The average depth is 12 feet. At no other place in the lake, however, have medusae yet been observed. The size of preserved specimens are the same as those collected from Crystal Lake, 6-12 mm., but some were observed in the water by Mr. Davis that were about 30 mm. in diameter. In the summer of 1948 the medusae did not appear until the first week of September. Mr. Glen Davis, owner of the Davis cottage, collected about 10 specimens at that time from the same location. They were fairly numerous for two weeks, but not nearly so abundant as they had been the preceding year. Two fishermen reported observing them in middle September, having found them over the same snag. The senior writer, accompanied by Mr. Glen Davis, was unable to find any on September 26.

Prof. William Adams, Jr. and Prof. W. Hughes Barnes of Muskingum College collected abundant specimens of *C. sowerbii* from a limestone quarry near Zanesville between July and October of 1947 and 1948. They plan to publish the detailed results of their observations at a later date.

NEW RECORDS FROM PENNSYLVANIA

Prof. Kimber C. Kuster of the State Teachers College, Bloomsburg, Pennsylvania, published a note (1938) on the collection of medusae from an abandoned limestone quarry near the village of Almedia, Columbia County, from August to October of 1937. He has written to us that since that time medusae have been found every summer in the same quarry until the season of 1947 when they were

neither observed by him nor reported to him by bathers. During the ten-year interval when medusae were observed, they varied in abundance from one year to another, being very common some years and much less common other years.

Mr. David Shortess collected a great abundance of medusae for the General Biological Supply House from Fox Run, a slow-moving stream, some five miles northwest of York in the late summer of 1946. The stream is 25 feet wide and not over three feet deep where the collection was made. Shortly after his specimens were collected a rain storm swelled the stream, sweeping away the population, and medusae have not been found there since. He observed two color groups, "clear white" and "greenish."

On September 15 and 16, 1947, Ladd Heldenbrand, a student at Kent State University at the time, discovered fresh-water jellyfish in abundance at the northern

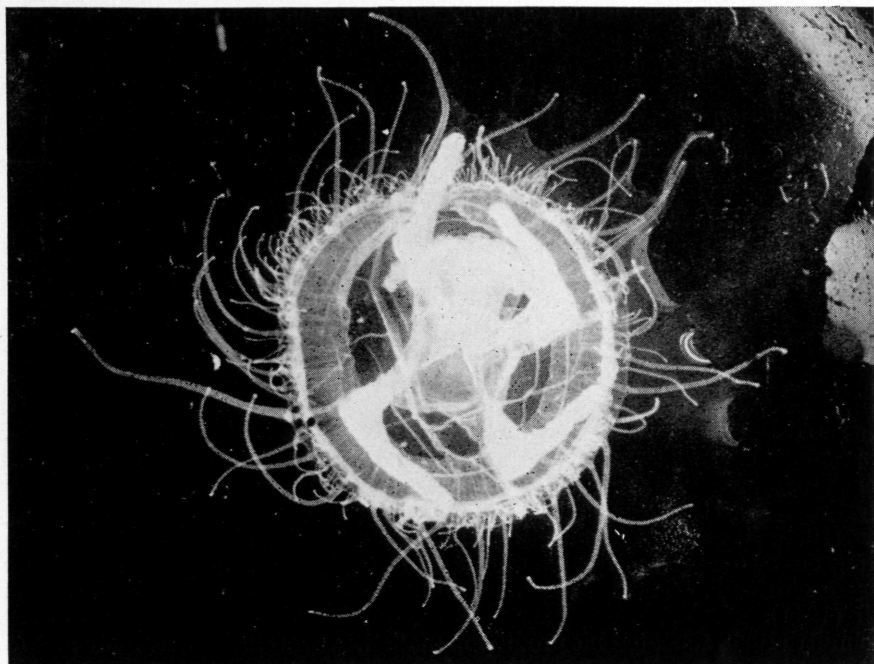


FIG. 2. *Craspedacusta sowerbii* from Lake Milton, 1947.

Photo by H. K. Datson.

end of Lake Wallenpaupack. Attempts to capture specimens with his hands failed. Unfortunately collecting equipment was not available. However, since he had previously studied preserved specimens in the zoological laboratories and he was able to make close observation of large numbers in the lake, there can be no question as to the correctness of his identification. This lake was impounded in the Wallenpaupack River in 1923 for hydroelectric power by the Pennsylvania Power and Light Company of Scranton. The lake is some 30 miles east of Scranton. It is 12 miles long with an average width of two miles. Total area is 216,000 acres, and greatest depth is 90 feet. The medusae were found over a stretch of about three miles. In the summer of 1948 Mr. Heldenbrand returned with collecting equipment, but specimens were neither found nor reported by anyone on the lake. On September 5, 1949, however, he succeeded in collecting specimens of *C. sowerbii* which were found in abundance distributed throughout an area of

about one square mile. Thirty-seven specimens sent to the senior writer for study ranged in size from 7–15 mm., the great majority being 12–15 mm. All of these specimens were females, and all of the loose gonads from broken medusae were ovaries. At the time of collecting, the surface water was very still and its temperature was 68° F. The following day no specimens could be found. Deevey and Brooks (1943) reported *C. sowerbii* from a lake in Connecticut with an area of 271 acres and a maximum depth of 65 feet. They claimed that it was the first record of fresh-water medusae from an open lake. The above discovery of medusae in Lake Wallenpaupack enlarges the known lake-size habitat of this organism many times.

NOTES ON HABITAT, SEASONAL OCCURRENCE AND GEOGRAPHICAL DISTRIBUTION

Fresh-water medusae have been most often found in quarry and fish ponds, concrete pools and tanks, gravel pits, and small shallow lakes. This paper reports specimens from two large impounded lakes, Lake Milton and Lake Wallenpaupack, both of which are much larger than any previously reported lake habitat. One stream population, that of Fox Run, is added to the few records of such a habitat known from North America. Previously, Takony Creek and the Schuylkill River in Pennsylvania, the Vermillion River in Ohio, Benson Creek and the Kentucky River in Kentucky, and Willamette River in Oregon have been reported. The statement of Dejdar (1934) that *C. sowerbii* is found "in natural lakes that are apparently always connected with flowing water" is certainly not the case in many of the American records made from such habitats as artificial goldfish ponds, quarry ponds, concrete tanks, etc.

Many zoologists believe that the hydroid stage is introduced into bodies of water with transplanted water plants or fish, and that it reproduces by asexual budding only. Thus is explained the collecting of males only by Viosca and Burkenroad (1936), Van Auken (Loudonville specimens) (1940), Deevey and Brooks (1943), Fincher and Buchanan (1944), and from the Berea quarries described in this paper; and of females only by Payne (1924), Baird (1932), Woodhead (1933), Milne (1938), Powers (1938), Van Auken (Garnet Lake specimens) (1940), and from a reservoir near Athens, Crystal Lake, and Lake Milton as mentioned in this paper. Only Payne (1926) has reported collecting both sexes together. He concluded that in budding off medusae the hydroids are apparently male producing or female producing exclusively. The matter was summarized in an unpublished report by Kostir (1941).

Schmitt (1939) repeated his prediction made 12 years earlier that more and more specimens of the sporadic and relatively rare fresh-water medusae would be found and reported as more attention over a wider area was turned to the problem. In addition to the increase in the number and distribution of observers, another factor which seems to bring records of occurrence to light is that certain years are apparently favorable ones for the production of this organism in great quantity. The years of 1932, 1933, 1934, 1936, 1937, and 1947 were times when most of the recent North American records have been discovered and years when jellyfish were found in great abundance.

Most of the collecting in this country has been done from July to October, although records are known as early as May and as late as November. September is the month of most frequent discovery and greatest abundance.

Fresh-water medusae have been reported from 25 states (Conn., N. Y., N. J., Penn., Md., Va., W. Va., Ohio, Mich., Ind., Ill., Ky., Tenn., Ga., Ala., Miss., La., Ark., Mo., Iowa, Texas, Okla., Kan., Ore., and Wash.), Washington D. C., Quebec, and the Panama Canal Zone. All of the state records except Oregon and Washington (aquarium record only from Washington) are in the eastern half of the United States.

SUMMARY

1. The fresh-water medusa *Craspedacusta sowerbii* is reported from 12 new localities in Ohio and Pennsylvania and from two previously known localities in which it has reappeared.
2. Two lake habitats are recorded, Lake Milton in Ohio and Lake Wallenpaupack in Pennsylvania, which are the largest yet known to be inhabited by jellyfish.
3. Medusae are usually found from July to October in quarry and fish ponds, reservoirs, and small lakes.
4. A new stream record (Fox Run in Pennsylvania) is reported for North America.
5. All state and similar locality records known from North America are listed.

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